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Bidirectional Associations Between Emotions and School Adjustment

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Abstract

Objective—We examined the relations of children’s ($N = 301$) observed expression of negative and positive emotion in classes or non-classroom school contexts (i.e., lunch and recess) to school adjustment from kindergarten to first grade.

Method—Naturalistic observations of children’s emotional expressivity were collected, as were teachers’ reports of children’s school engagement and relationship quality with teachers and peers.

Results—In longitudinal panel models, greater teacher–student conflict and lower student engagement in kindergarten predicted greater negative expressivity in both school contexts. School engagement and peer acceptance in kindergarten positively predicted first grade positive emotion in the classroom. Suggestive of possible bidirectional relations, there was also small unique prediction (near significant) from negative expressivity at lunch and recess to higher teacher–student conflict, from negative expressivity in the classroom to low peer acceptance, and from positive expressivity in the classroom to higher peer acceptance.

Conclusions—The pattern of findings suggests that the quality of experience at school uniquely predicts children’s emotional expressivity at school more consistently than vice versa—a finding that highlights the important role of school context in young children’s emotionality at school.

Keywords

elementary school; kindergarten; negative emotion; positive emotion; school adjustment

Emotions and adjustment are intricately related (e.g., Diaz et al., 2017; Dougherty, 2006; Valiente, Swanson, & Lemery-Chalfant, 2012). Temperamental emotionality, especially

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Declaration of Conflicting Interests

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negative emotionality, partly has a genetic basis (Clifford, Lemery-Chalfant, & Goldsmith, 2015; Planalp, Van Hulle, Lemery-Chalfant, & Goldsmith, 2016). However, given that temperament is also shaped by experience (Rothbart & Bates, 2006), social experiences in school might affect individuals' daily emotional expressivity tendencies. Social baseline theory, for example, proposes that social proximity and interaction with meaningful others are primary conditions for sustaining a state of tranquility, whereas social conflict creates stress responses and activates negative emotions (Beckes & Coan, 2011). Consistent with this theory, children's early attachment relationships with caregivers predict emotional expressivity over time (Kochanska, 2001; Morris, Silk, Steinberg, Myers, & Robinson, 2007); for example, having a secure attachment relationship with their parent, compared to having an avoidant attachment relationship, predicted children's lower negative emotion and higher positive emotion across time, controlling for the emotions' stability (Kochanska, 2001). Additionally, transitions across schooling include change and stability in relationships between the child and the school environment, including relationships with teachers and peers, which have implications for how children experience school over time (Rimm-Kauffman & Pianta, 2000). Thus, children's school adjustment (broadly defined as school-related adjustment, e.g., teacher–student relationship quality, school engagement, and peer acceptance) may also predict children's emotional expressivity in school.

Understanding both the predictors and consequences of emotional expressivity at school could help to clarify the role of emotion in children's school adjustment, and adjustment more generally. Thus, the goals of this study were to examine whether observed expression of negative or positive emotion at school and children's school adjustment predict one another across time from kindergarten (K) to first grade (G1). Identifying how emotional expressivity predicts school adjustment, and vice versa, has implications for improving children's academic achievement (i.e., grades, academic competence) given that emotions (e.g., Denham, Bassett, Thayer, et al., 2012; Pekrun & Linnenbrink-Garcia, 2012; Valiente et al., 2012) and school adjustment, including school engagement (e.g., Chien et al., 2010), teacher–student relationship quality (e.g., McCormick, O'Connor, Cappella, & McClowry, 2013), and peer acceptance (e.g., Zhou, Main, & Wang, 2010), have all predicted academic achievement in elementary school.

Moreover, we examined if this pattern varied with the context in which the emotion was expressed. Emotional expressivity often varies across different contexts (e.g., in class or recess), based in part on norms regarding expected or appropriate emotional displays (Diaz & Eisenberg, 2015). Thus, investigating the extent to which positive and negative emotions expressed in different environments relate to school adjustment might provide insight on children's socio-emotional competence (Halberstadt, Denham, & Dunsmore, 2001; Saarni, 2008).

Emotional Expressivity in Different School Contexts

As just noted, it is useful to examine contexts when considering relations between children's emotional expressivity and their adjustment at school. Children must navigate different social spheres, and it is likely that they adjust to school better if they appropriately vary their expression of emotion in a manner consistent with emotion display norms in specific

contexts. The optimal balance hypothesis, for example, proposes that children need to regulate their emotions and decipher social-emotional cues in school in order to adapt to classroom expectations (Blair & Dennis, 2010). In the classroom, children interact with teachers and peers in a supervised environment geared toward academic activities wherein disruptive behaviors would typically conflict with classroom goals. Thus, children's emotional expressivity in the classroom may be especially associated with factors closely linked to classroom behaviors, such as teacher–student relationship quality and school engagement, over time. In contrast, in settings where children interact with peers with less adult supervision, such as in lunch and recess in school, children's emotional expressivity may be especially related to the quality of peer interactions and thus be more strongly predictive of peer acceptance (or vice versa). Therefore, emotional expressivity in different contexts at school may be differentially associated with adaptive school outcomes. However, children's emotional expressivity in naturalistic settings, such as in school or during parent–child interactions, has typically been observed within a single social environment (during free-play in school, Herndon, Bailey, Shewark, Denham, & Bassett, 2013; during free-play in a parent–child task, Olino et al., 2011). To more precisely identify associations with emotion expressivity in the school context, in this study we distinguished positive and negative emotions expressed in either the classroom or in lunch and recess settings.

Emotional Expressivity Predicting School Adjustment

Negative emotional expressivity is thought to place children at risk for difficulties with peers and teachers, also hampering their ability to engage in classroom academic tasks. This has implications for children's behaviors in school and social skill development. Negative emotions have been associated with social withdrawal or approach to conflict (Eisenberg et al., 1999; Valiente et al., 2012), which is not optimal for developing warm relationships with others. For example, children's negative affect has negatively predicted positive parent–child relationship quality (Kochanska, Friesenborg, Lange, & Martel, 2004; Lipscomb et al., 2011). Regarding children's relationships with others in school, children's negative emotional expressivity (e.g., anger, sadness) has been associated with lower peer (Dougherty, 2006; Fabes, Hanish, Martin, & Eisenberg, 2002; Reijntjes, Kamphuis, Prinzie, & Telch, 2010; Sallquist et al., 2009; Valiente et al., 2012) and teacher–student relationship quality (Diaz et al., 2017; Hernández et al., 2017; Valiente et al., 2012). Some of these studies have been longitudinal (e.g., Dougherty, 2006; Fabes et al., 2002), but they have not used analyses that examine the directionality of effects (see meta-analysis by Reijntjes et al., 2010, for an exception on bidirectional associations between internalizing symptoms and peer victimization). Furthermore, testing for bidirectional effects in a cross-lagged panel model, in which prior levels of each variable are controlled for, allows for a relatively rigorous test of relations regarding rank-order change in the outcomes of interest, which prior studies typically have not tested.

There are circumstances when negative emotionality may not be inversely related to peer acceptance. Anger, for instance, can sometimes be an expression of dominance associated with high (i.e., children who are well liked by peers) or controversial peer status (i.e., children who are liked and disliked by peers; Ladd, 2005). However, we were interested in general negative emotion (not exclusively anger). Thus, consistent with previous research

(e.g., Dougherty, 2006; Sallquist et al., 2009), negative emotion expressed in school was expected to predict lower peer acceptance, perhaps especially when expressed in more peer-centered contexts because negative interactions with peers would be most related to being disliked by peers. Such prediction from negative emotion to peer acceptance based on peer nominations was not found within K in another study based on the same sample (there was a significant zero-order correlation), after covariates (e.g., verbal competence, socioeconomic status) were controlled for (Hernández et al., 2016).

Children's negative expressivity has been associated with lower school engagement (Denham, Bassett, Thayer, et al., 2012; Kwon, Hanrahan, & Kupzyk, 2016; Valiente et al., 2012), perhaps because negative emotion (especially negative emotion high in motivational intensity; Gable & Harmon-Jones, 2010) narrows attention and often conflicts with cooperation and attention to academic tasks commonly practiced in the classroom.

In contrast, theory suggests that positive emotion expressions invite and help maintain pleasant social interactions (Fredrickson, 2001), but there are relatively few empirical studies supporting this proposition. For example, children's positive emotional expressivity has been positively associated with social competence with peers (Denham, Bassett, Mincic, et al., 2012; Dougherty, 2006; Hernández et al., 2017; Reschly, Huebner, Appleton, & Antaramian, 2008; Spinrad et al., 2004), and, to a lesser extent (because there are fewer studies), with teacher–student relationship quality (Hernández et al., 2016; Reschly et al., 2008). The research literature on parent–child relationships also suggests that children's positive emotional expressivity may be a precursor to relationship quality; for instance, infants' positive behaviors (e.g., smiling, laughter) have predicted fewer negative maternal parenting behaviors (Bridgett, Laake, Gartstein, & Dorn, 2013). Also, Kochanska et al. (2004) found that children's positive affect predicted positive aspects of relationship quality with mothers and fathers. Furthermore, positive expressivity has been associated with persistent engagement in academic tasks (which have a substantial social component of collaboration and cooperation; Kwon et al., 2016; Pekrun & Linnenbrink-Garcia, 2012; Sirotkin, Denham, Bassett, & Zinsser, 2013). However, the majority of these studies regarding school adjustment have been based on cross-sectional research designs (see Spinrad et al., 2004, for an exception). As mentioned earlier, these studies (which are few) have usually examined overall positive emotion and have not considered positive emotion expressed in different settings. Although a preliminary hypothesis, we predicted that positive emotions at lunch and recess—where interactions are primarily with peers, play and discussion are more freely allowed, and there is less adult supervision than during classroom time—may be particularly likely to predict (and be associated with) peer acceptance. In a prior study, we found that positive emotional expressivity in lunch and recess context predicted lower teacher–student conflict within K (Hernández et al., 2016). However, positive emotion has sometimes been associated with low self-regulation and impulsivity (Sallquist et al., 2009) and thus, intense positive emotion expressivity during classroom time may also be disruptive to school adjustment, including forming quality teacher–student relationships and school engagement.

School Adjustment Predicting Emotional Expressivity

The social baseline theory proposes that interactions with meaningful others support a baseline state of tranquility, whereas social conflict activates negative emotions (Beckes & Coan, 2011). From this perspective, the quality of children's relationships and experience in school may predict children's emotional expressivity in school such that positive child and school environment interactions predict higher positive emotion and lower negative emotion in school (Rimm-Kauffman & Pianta, 2000). Based on these theories, positive social relationships with teachers and peers are important influences on expressing positive emotions and diminishing negative emotional expressivity. Thus, children who are not accepted by their peers or have conflict with teachers could have negative early experiences and perceptions of school, and thus may be more likely to express negative emotions and less likely to express positive emotions at school. Consistent with the social baseline theory, poor peer relationships are positively associated with increases in children's negative affect (Dill, Vernberg, Fonagy, Twemlow, & Gamm, 2004; Reijntjes et al., 2010). Teachers have a profound role in children's enjoyment of school (Frenzel, Goetz, Lüdtke, Pekrun, & Sutton, 2009), but less is known about whether teacher–student relationship quality relates to children's emotional expressivity in school. Furthermore, in K, typically a child's introduction to formal schooling, social relationships may leave a lasting impact on children's school experience (Reijntjes et al., 2010). Socially competent children may have more positive experiences with others, and thus be more likely to express positive emotion over time. We hypothesized that teacher–student relationship conflict and closeness would be associated with children's negative and positive emotional expressivity in school one year later, especially in the classroom where teachers have a strong socializing role (Hendrickx, Mainhard, Oudman, Boor-Klip, & Brekelmans, 2016).

The Present Study

Based on the research literature reviewed, questions remain about how emotions and adjustment in school relate across time. In the present study, we examined whether there were bidirectional associations between the observed expression of negative or positive emotion, either in classroom or lunch and recess school settings, and various measures of children's school adjustment in a longitudinal panel model from K to G1.

Based on a prior study involving the same sample only in kindergarten, we found that negative emotion in the classroom, as well as in lunch and recess, predicted higher teacher–student conflict (teacher–student closeness was not examined; Hernández et al., 2016). Across time, however, negative emotion in the classroom, more than at lunch and recess, may have a stronger positive association with teacher–student conflict, as well as negative associations with teacher–student closeness and school engagement, given that academic demands in the classroom change in G1 (La Paro, Rimm-Kaufman, & Pianta, 2006), requiring students to flexibly adjust their emotional expressivity in the classroom. We expected that negative emotional expressivity, perhaps especially in the classroom, would be associated with lower school adjustment (i.e., higher teacher–student conflict, lower teacher–student closeness, lower school engagement), within and across a year's time.

In prior analyses with this sample, negative emotion in either the classroom or lunch/recess contexts did not uniquely predict concurrent peer acceptance measured with peer nominations in K (Hernández et al., 2016), although anger, an intense type of negative emotion, measured in the fall predicted lower peer acceptance measured in the spring in K (Hernández, Eisenberg, Valiente, Spinrad, et al., 2017). Negative emotion, including anger, is more frequently and intensely expressed in the lunch/recess context (Hernández et al., 2016). Thus, we tentatively predicted that negative emotional expressivity, perhaps more consistently when expressed in lunch/recess when peer interactions occur in a less supervised environment, would be negatively associated with peer acceptance within and across time.

In contrast to negative expressivity, we expected positive emotion expressivity to foster positive connections with teachers and peers, as well as engagement in academic tasks, during the transition from K to G1. In a prior study, we found that positive emotional expressivity separately in each school context predicted peer acceptance within K (Hernández, Eisenberg, Valiente, Spinrad, et al., 2017). Such a positive relation between positive expressivity and peer competence over time might be especially evident during lunch and recess because these involve primarily peer interactions. In regard to the quality of children's relationships with their teachers and school engagement in classroom tasks, positive emotional expressivity has sometimes been related to self-regulation difficulties (Sallquist et al., 2009) and thus, more frequent and intense positive emotion expressivity during classroom time may sometimes be associated with self-regulation difficulties that disrupt school adjustment. However, positive expressivity seldom is intense in the classroom (Hernández et al., 2016); thus, we hypothesized that positive emotional expressivity in the classroom would be associated with better school adjustment within and across time from K to G1 especially because positive expressivity promotes academic-related skills tied to classroom tasks.

To test these hypotheses, we used observations of the expression of negative and positive emotion in school and teachers' reports of child social adjustment using a longitudinal panel model to examine bidirectional associations and change from K to G1. Testing bidirectional associations across time extends prior research in this area, given that most prior studies (including prior analyses from the present research project) have been cross-sectional and, even when longitudinal, have typically been designed to test a unidirectional association from emotion to the outcomes of interest (see Dill et al., 2004, for an exception).

Method

Participants

Participants were kindergarteners ($N = 301$; 52% girls; $M_{\text{age}} = 5.48$ years, $SD_{\text{age}} = 0.35$ years) in a southwestern metropolitan area in the United States. Two cohorts of children from five schools were drawn from 26 classrooms at the beginning of the school year, one year apart. Participants were from various ethnic backgrounds (53% Hispanic, 34% White, 3% Asian, 2% American Indian/Alaska Native backgrounds, 2% Black, 1% Other, 6% Unknown [percentages are rounded]) and parents had varied education (30% of mothers and

39% of fathers completed high school or less, 31% of mothers and 24% of fathers attended some college, and 39% of mothers and 37% of fathers graduated from college).

Procedure

Teachers received a survey for each participating child during the spring semesters of K and G1 assessing children's school engagement and relationship quality with teachers and peers. Parents received a questionnaire for each participating child during the fall semester of kindergarten. Teachers and parents were compensated \$15 and \$30, respectively, for each survey. Adult observers scored children's emotional expressivity in the classroom during the fall and spring semesters of K and G1. Children's school engagement was observed in the spring semesters of K and G1. Research assistants (observers) were trained for four weeks to observe and then rate child interactions. Training sessions included detailed description of the coding process (lasting 2 hours), observations in pilot preschool settings and, after the first year for the first cohort, also with pre-coded videos of actual interactions among children (four 2-hour and two 1-hour sessions observing and reviewing in pre-coded videos and in pilot live settings, and an additional 2-hour session if observers needed additional training). After initial training, research assistants completed refresher training sessions before going into the field in subsequent semesters (3–4 hours observing and reviewing pre-coded videos and in pilot live settings). Reliability with an expert coder was assessed on a bi-weekly basis throughout observations. Two or three research assistants conducted observations in school, two to three times each week for nine to twelve weeks each semester. Research assistants had a list of participants for each class and coded an individual child's emotional expressivity and engagement after 30 s of observation. Observation of the first child was selected at random from the list and individual children were not coded again until the entire list of children, if present, was coded. Parents provided information on family (i.e., parental education, income) and child characteristics (i.e., age, sex) in K.

Measures

Positive and negative emotional expressivity—Based on the observed intensity, frequency, and duration of children's positive (e.g., happiness, joy, excitement, amusement, pride, positive anticipation, and awe) and negative (e.g., anger, frustration, sadness) expressivity exhibited in classroom (e.g., classroom, art and music lab, library) and recreational settings (e.g., lunch, recess), observers rated children's emotional expressivity for 30 s intervals in the fall and spring semesters of K and G1. Positive expressivity refers to expressions demonstrated by the following indicators: smiles, cheeks raised, eyes squinted in an intense smile or wide and bright when excited or joyful, jumping up and down, and chest and head up and upbeat tone or laughter. Expressions of negative emotion included pouted lips, lips downturned in a frown, behavior (e.g., brows down or arched in sadness, crying), vocal tone (e.g., whiny) and content (e.g., "She made me feel bad."), vocalizations (e.g., slow, gentle sighs). Emotion was coded on a 0 to 3 scale: 0 = *no evidence of emotion*; 1 = *minimal evidence* (e.g., emotion indicator seen once, small intensity and brief [< 3 s]); 2 = *moderate evidence* (e.g., two indicators of emotion, small intensity, and brief; one indicator of emotion, small intensity, lasting 4 to 9 s; one indicator, medium intensity, lasting < 5 s); 3 = *strong evidence* (e.g., three or more indicators, small intensity, and brief; two or more indicators, medium intensity; one or more indicators, small intensity, lasting more than 10 s;

one or more emotional displays, medium intensity, lasting more than 5 s; any high intensity indicator).

This observation method has been used in prior research (e.g., Spinrad et al., 2004) and demonstrated adequate reliability and predictive validity. Reliability ratings from this study were obtained from pre-coded videos (used only for reliability and only in G1) and randomly selected live observations (8.5% [K] and 10% [G1] of observations) rated simultaneously with expert coding supervisors. Inter-observer reliabilities (based on the intraclass correlation [ICC]) for K and G1 were .96 and .95, respectively, for positive emotion and .96 and .96 for negative emotion. For each participant, observers' ratings were averaged across all observations for positive and negative emotion in K ($M_{time} = 86$ min 36 s [classroom], 46 min 13 s [lunch/recess]) and G1 ($M_{time} = 102$ min 19 s [classroom], 46 min 15 s [lunch/recess]), representing emotional expressivity levels in a specific school setting.

Teacher–student conflict and closeness—In the latter part of the spring semesters of K and G1, teachers (different in each grade) rated (1 = *definitely does not apply*; 5 = *definitely applies*) their perceived conflict (7 items, e.g., “This child and I always seem to be struggling with each other”, $\alpha = .90$ [K], .89 [G1]; Pianta, Steinberg, & Rollins, 1995) and closeness (8 items, e.g., “I share an affectionate, warm relationship with this child,” $\alpha = .81$ [K], .83 [G1]) with child participants. These measures have been used in previous studies in elementary school, showing strong psychometric properties (Birch & Ladd, 1997; Hamre & Pianta, 2001) and stability over time (Jerome, Hamre, & Pianta, 2009). For each scale, items were converted into three parcels by randomly grouping and averaging those items together to be used as indicators for the latent variables of teacher–student closeness and conflict in K and G1.

Peer acceptance in school—In the spring semesters, teachers reported on children's peer acceptance (1 = *not at all like*, 4 = *very much like*, 8 items, e.g., “This child has a lot of friends at school,” $\alpha = .93$ [K], .92 [G1]), using the MacArthur HBQ Social Functioning Scales (Armstrong, Goldstein, & The MacArthur Working Group on Outcome Assessment). Similar measures have been used in previous studies of elementary school children, showing adequate psychometric properties, reliability over time, and predictive validity (e.g., Obradović, 2010). In addition, teachers' reports of peer behaviors have corresponded with observations of peer behaviors in school (McNeilly-Choque, Hart, Robinson, Nelson, & Olsen, 1996) or children's sociometric ratings (Eisenberg et al., 1993), and preschool teachers tend to agree on children's peer status (and their ratings of peer status relate to peers' reports of children's aggression; Maszk, Eisenberg, & Guthrie, 1999).

School engagement—School engagement was assessed using three measures, based on prior research regarding cognitive, affective, and behavioral engagement (Wang & Degol, 2014). In the latter part of the spring semesters of K and G1, teachers rated children's liking of school (1 = *does not apply*, 2 = *applies sometimes*, 3 = *certainly applies*; 7 items; e.g., “This child enjoys most classroom activities,” $\alpha = .87$ [K], .82 [G1]), cooperation (7 items; e.g., “This child follows a teacher's directions,” $\alpha = .90$ [K], .93 [G1]), and independence (4 items; e.g., “Is a self-directed child,” $\alpha = .81$ [K], .80 [G1]) using the Teacher Rating Scale of School Adjustment (Birch & Ladd, 1997). Scale items were averaged (after

reversing items as appropriate) for each scale within each school year. The school liking, cooperation, and independence scale scores were used as indicators for the latent variables of K and G1 school engagement.

Covariates—Control variables included child age, Hispanic status (0 = *non-Hispanic* [i.e., white, Asian, American Indian/Alaska Native, or Black]; 1 = *Hispanic*), sex (0 = *girl*; 1 = *boy*), and socioeconomic status. Socioeconomic status was computed by averaging the *z* scores of parents' averaged education and family income, which were correlated ($r = .67$, $p < .001$).

Results

Preliminary Analyses

Table 1 provides descriptive statistics for the study variables, as well as correlations among the study variables. The percent of missing data, which ranged from 0 to 13% for most variables (except for teachers' reports of child behavior in G1, which had 22–23% missing data), was examined before testing the proposed models. Based on a comparison of all study variables using independent samples *t*-tests, children who had some missing data had lower socioeconomic status ($t = -3.51$, $p < .05$) compared to children who had data; all other variables were not significantly different across the two groups of children.

Analyses were conducted using full-information maximum-likelihood estimation with robust standard errors (MLR) and the TYPE=COMPLEX command to account for the non-independence of observations due to clustering of data in *Mplus* Version 7.4 (Muthén & Muthén, 1998–2015). K classrooms were used as the cluster variable due to having more students per classroom in K. Model fit was assessed with the chi-square test of model fit (χ^2), the comparative fit index (CFI; Bentler, 1990), and root mean square error of approximation (RMSEA; Browne & Cudeck, 1993). Regression coefficients are presented in a standardized metric (b^*), representing effect sizes.

Measurement invariance across time, which evaluates whether a scale assesses the same construct across each time point (Widaman, Ferrer, & Conger, 2010), was tested for the latent constructs of teacher–student conflict, teacher–student closeness, peer acceptance, and school engagement (separately for each construct because they were further analyzed in separate models; see below). Configural, weak, strong, and strict measurement invariance were tested by sequentially constraining factor loadings, measurement intercepts, and unique variances to be equally estimated across time, respectively. Change in fit for each invariance model was compared sequentially and the model with additional constraints was preferred if it fit as well or better than the model with fewer constraints (Widaman et al., 2010).

We found evidence for at least partial strict measurement invariance across time for all latent constructs. There was adequate longitudinal invariance in the measurement properties for teacher–student conflict (partial strict invariance¹; CFI = 1.0, RMSEA = .01; standardized factor loadings: .72–.99), teacher–student closeness (strict invariance; CFI = .97, RMSEA = .

¹One factor indicator residual variance in G1, which was not significant, was fixed to zero.

05; standardized factor loadings: .78-.84), peer acceptance (strict invariance; CFI = .99, RMSEA = .03; standardized factor loadings: .80-.95), and school engagement (strict invariance²; CFI = .93, RMSEA < .09; standardized factor loadings: .56-.85) latent variables. These measurement constraints were retained in subsequent longitudinal panel model analyses.

Negative Expressivity and Child School Adjustment

We tested eight models identifying bi-directional pathways between negative expressivity and one of four school adjustment outcomes, controlling for background covariates³. Separate models for emotion by context were conducted, given that analyzing them together would raise multicollinearity concerns. In two separate bi-directional models with negative expressivity (in either the classroom or during lunch/recess) and teacher–student conflict, K teacher–student conflict consistently predicted higher G1 negative emotion expressivity in both the classroom (Table A1, Column 1; $b^* = .19, p = .02$) and during lunch/recess (Table A1, Column 2; $b^* = .15, p = .02$). That is, one standard deviation in K teacher–student conflict was associated with a .19 standard deviation difference in G1 negative emotion expressivity in the classroom and a .15 standard deviation difference in G1 negative emotion expressivity during lunch/recess. These effect sizes are small but represent practical implications for social science data (Ferguson, 2009) that control for prior levels of study variables. In addition, K negative expressivity in lunch/recess predicted higher G1 teacher–student conflict ($b^* = .14, p = .09$; Table A1, Column 2). Thus, there was a weak bidirectional cross-lagged pattern between negative expressivity during lunch/recess and teacher–student conflict.

Negative emotional expressivity in the classroom at K was unexpectedly associated with higher G1 teacher–student closeness at a marginal significance level ($b^* = .09, p = .08$; Table A2, Column 1). In zero-order correlations (Table 1), the association between K negative expressivity and G1 teacher–student closeness was not significant; thus, a positive association emerged only after prior levels of teacher–student closeness and covariates were controlled. No significant cross-lagged associations emerged between negative expressivity during lunch/recess and teacher–student closeness (Table A2, Column 2).

In models with peer acceptance, there was a bidirectional association between negative emotion in the classroom and peer acceptance from K to G1 (Table A3, Column 1; $b^* = -.17, p = .05$ [path for peer acceptance predicting negative emotion]; $b^* = -.09, p = .10$ [path for negative emotion predicting peer acceptance]), although the relation from K negative emotionality to G1 peer acceptance was only near significant. No significant cross-lagged associations emerged between negative expressivity during lunch/recess and peer acceptance (Table A3, Column 2). In contrast, higher K school engagement predicted lower G1 negative

²The residual variances of the independence subscale indicators were correlated across time.

³Interactions between family socioeconomic status and kindergarten negative emotional expressivity during lunch and recess predicting teacher–student conflict and school engagement were significant in separate models. Negative emotion during lunch and recess predicted higher teacher–student conflict for children with low ($b = 1.63, p = .01$), average ($b = 1.48, p = .01$), and high ($b = 1.32, p = .03$) levels of family socioeconomic status. The simple slopes predicting school engagement at low, average, and high levels of family socioeconomic status were not significant. Therefore, socioeconomic status was kept as a covariate instead as a moderator of the associations.

emotional expressivity levels in both the classroom (Table A4, Column 1; $b^* = -.22$, $p = .01$) and at lunch/recess (Table A4, Column 2; $b^* = -.14$, $p = .05$), but not vice versa.

Positive Expressivity and Child School Adjustment

In an analogous set of analyses, we tested eight panel models identifying the associations between positive emotional expressivity, in the classroom or at lunch/recess, with the four indices of school adjustment from K to G1, controlling for background covariates. We analyzed separate models for positive emotion in the classroom or at lunch/recess. Peer acceptance and positive emotion in the classroom had a weak bidirectional association (Table A3, Column 3); specifically, peer acceptance in K predicted G1 positive expressivity ($b^* = .08$, $p = .04$) and positive expressivity in K marginally predicted G1 peer acceptance ($b^* = .09$, $p = .09$). School engagement in K predicted G1 positive emotional expressivity in the classroom (Table A4, Columns 3; $b^* = .11$, $p = .04$), but not vice versa.

No cross-lagged relations were found between positive expressivity in the classroom and teacher–student conflict (Table A1, Column 3) or closeness (Table A2, Column 3). Similarly, no cross-lagged paths were significant between positive expressivity in lunch/recess and teacher–student conflict (Table A1, Column 4), teacher–student closeness (Table A2, Column 4), peer acceptance (Table A3, Column 4), or school engagement (Table A4, Column 4).

Discussion

The present study tested whether negative or positive emotional expressivity in different school settings (i.e., in the classroom or in lunch/recess) would predict children's school adjustment from K to G1, and vice versa. This study extends previous research by examining emotional expressivity in different school contexts across the critical K to G1 school transition (La Paro et al., 2006). Furthermore, this study, which was designed to test bidirectional associations across time, provided a relatively robust test of the associations of interest. Although emotional expressivity marginally predicted some school adjustment outcomes, overall the findings suggest that school experiences, including relationships formed with teachers and peers early in school, may also amplify the likelihood the expression of temperamental emotionality in school. That is, there are circumstances in school, partly related to social exchanges, that probably can alter children's emotional responses.

Peer Acceptance and Emotional Expressivity in School

We found partial support for the social baseline theory (Beckes & Coan, 2011) for peer acceptance which predicted lower negative emotion, and vice versa, although only in the classroom. The finding that negative emotion in the classroom in K predicted lower peer acceptance in G1 (at marginally significant levels) is consistent with prior findings on overall anger expressivity within K (Hernández, Eisenberg, Valiente, Spinrad, et al., 2017) and overall negative emotion in childhood (Dougherty, 2006; Fabes et al., 2002; Sallquist et al., 2009). Furthermore, the findings add support to previous research (based on a couple of

studies) suggesting that poor peer relationships are associated with increased negative emotion (Dill et al., 2004; Reijntjes et al., 2010).

Peer acceptance did not significantly predict lower negative emotion in lunch/recess, or vice versa in the models (Figure 1B), despite significant zero-order correlations. This finding was contrary to the expectation that peer acceptance would be associated with negative emotion particularly in lunch/recess settings because they are primarily peer contexts with less adult supervision. Rather, the findings suggest that negative emotion in the classroom is more indicative of social difficulties with peers, perhaps because emotions during social interactions are more likely witnessed by peers in a classroom group setting where children are near each other; that is, emotions might be more salient to peers in the classroom than in lunch/recess because children can opt to interact with different peers in lunch/recess. It is also possible that teachers are more likely to observe children's peer interactions in the classroom than in lunch and recess, resulting in associations being more consistent for negative emotion expressed in the classroom. Additionally, teachers' negative interactions with students seem to affect students' dislike of peers (Hendrickx et al., 2016), suggesting that children's negative emotions in the classroom might affect students' peer relationships due in part to the effect of negative expressivity on students' interactions with the teacher in classes. Alternatively, negative emotional expressivity may be more acceptable or common during play in recreational settings (Craig, Pepler, & Atlas, 2000), and thus was not negatively associated with later peer acceptance.

Also in support of social baseline theory, and a bidirectional relation, K peer acceptance predicted higher G1 positive expressivity in the classroom, and K positive expressivity in the classroom marginally predicted higher G1 peer acceptance (see Figure 2). Although researchers previously have reported that overall positive expressivity was associated with peer acceptance (e.g., Denham, Bassett, Mincic, et al., 2012; Dougherty, 2006; Hernández et al., 2017), this study is the first that we are aware of testing and demonstrating support for a positive bidirectional association between peer acceptance and positive expressivity in the classroom, albeit only marginal for the path from positive expressivity to predicting later peer acceptance. Consistent with the social baseline model, peer acceptance might promote positive emotional expressivity by encouraging social proximity and positive interactions with others. In addition, expressing positive emotions in the classroom may position students to have more pleasant interactions with others, which in turn promote social adjustment with peers. The findings point to a cycle of reinforcement between positive expressivity in the classroom and peer acceptance, although caution is warranted given the marginal relation from positive expressivity to peer acceptance.

We anticipated that peer acceptance would be more clearly associated with positive emotion in lunch/recess than in the classroom but the results suggest otherwise. Although lunch/recess positive emotion was concurrently correlated with peer acceptance, in both K and G1, perhaps positive emotion in the classroom, where more time is spent during school, is more indicative of children's positive social adjustment in school as observed by teachers. Or positive emotion at recess may often have more to do with pleasurable activities than social interactions. Alternatively, the null association between peer acceptance and positive emotion in lunch/recess from K to G1 may reflect the relative stability of this association

over time, given that peer acceptance and positive emotion in lunch/recess were correlated within time, especially in K.

Because intense positive emotion has sometimes been associated with low self-regulation and impulsivity (Sallquist et al., 2009) and positive emotion was higher in lunch/recess compared to the classroom (see Table 1), positive emotion in lunch/recess may not always positively predict peer acceptance. Intense positive emotion at recess/lunch may sometimes be inappropriate (e.g., laughing at a peer). For instance, one study found that positive emotion predicted higher peer acceptance in K only for children who were low in effortful control (Hernández, Eisenberg, Valiente, Diaz, et al., 2017). However, another study did not find a significant similar interaction (Rydell, Berlin, & Bohlin, 2003). Future research can test similar interactions across time given that the association between positive emotion and peer acceptance may be conditional on the extent to which positive emotion is appropriately regulated in school settings.

Teacher–Student Conflict and Emotional Expressivity in School

We found partial support for the social baseline theory with teacher–student conflict (Beckes & Coan, 2011). Teacher–student conflict predicted higher negative emotion in both classroom (see Figure 1A) and lunch/recess settings (Figure 1B), although negative emotion in lunch/recess also marginally predicted higher teacher–student conflict (Figure 2B; consistent with previous research, e.g., Valiente et al., 2012). This bidirectional finding highlights that negative emotion expressed in school (in lunch/recess settings) predisposes children to have conflictual relations with teachers, and that conflict with teachers perpetuates children’s expressions of negative emotion. The findings also echo prior research on child evocative effects on different aspects of parent–child relationship quality (Bridgett et al., 2013; Kochanska, 2001; Kochanska et al., 2004; Lipscomb et al., 2011). There were no pronounced differences in the associations between teacher–student conflict and negative emotion in the two contexts with the exception that negative emotion in the classroom did not even marginally predict later teacher–student conflict. In contrast to negative emotion during lunch/recess, negative emotion in the classroom may be tied to specific teachers and may not carry across grades to a new teacher–student relationship. Future studies examining what factors, such as classroom quality (La Paro et al., 2006) or interpersonal interventions (Lander, 2009), disrupt this bidirectional process would further our understanding on how to improve children’s school experiences.

Teacher–Student Closeness and Emotional Expressivity in School

Contrary to prediction, having warm and caring interactions with teachers was not associated with reduced negative emotion or increased positive emotion. The null findings for positive emotion are partly consistent with another study, which found that positive emotions were not significantly associated with teacher–student closeness in kindergarten (Diaz et al., 2017). Unexpectedly, negative emotion in the classroom predicted higher closeness at a marginally significant level. We speculate that if children show negative emotion in the K classroom, teachers may be more likely to invest in their relationship with these students, which could have resulted in the marginally significant positive effect from negative emotion in the K classroom to teacher–student closeness in G1 (see Figure 1A).

However, the positive prediction from negative expressivity in the classroom to teacher–student closeness only emerged in the analytical model and the association was not present in zero-order correlations (Table 1). Consequently, this marginal finding should be interpreted within the context of all variables in the analytical model (MacKinnon, Krull, & Lockwood, 2000) and be further examined.

School Engagement and Emotional Expressivity in School

Across time, school engagement predicted negative expressivity but not vice versa, inconsistent with previous research (e.g., Denham, Bassett, Thayer, et al., 2012; Diaz et al., 2017; Kwon et al., 2016). The novel finding that school engagement in K predicted lower classroom and lunch/recess negative emotion expressivity as well as higher classroom positive emotion expressivity in G1 emphasizes the potential importance of school engagement for children’s emotional experience in school. Engagement was expected to be more relevant to emotion in the classroom than in lunch/recess, and this was the case for positive emotion. For negative emotion, there were effects from school engagement to negative emotion expressivity in both school contexts. Preparing young children to meet school expectations has implications for their subsequent enjoyment of and emotional engagement in school, perhaps through daily interactions with teachers and peers in the classroom. Perhaps engagement in school prompts intrinsic and extrinsic rewards in early childhood that minimize children’s negative emotions in school and promote positive emotions in the classroom (Reeve, 2006). Importantly, the pattern of findings highlights the need to integrate longitudinal designs, as well as potential mediators, to understand the mechanisms by which children’s engagement and emotion in school are related.

Although prior researchers have found that positive emotion is positively directly or indirectly associated with engagement (e.g., Hernández et al., 2016; Sirotkin et al., 2013), we did not find empirical support for that proposition in the longitudinal model using observations of emotion and teachers’ reports of children’s school engagement). Perhaps the association between positive emotion and school engagement is best described as a contemporaneous relation. Also, most studies on positive emotion and academic engagement have been based on older children, adolescents, and (primarily) college students (Pekrun & Linnenbrink-Garcia, 2012). Thus, in early schooling, school engagement may be a better predictor of later positive emotion (rather than the opposite direction) given extrinsic rewards from teachers and parents associated with being more engaged in academic tasks (Reeve, 2006).

Study Strengths, Limitations, and Future Directions

Strengths from the present study include the use of observational methods to assess emotional expression in school across the transition from K to G1. This longitudinal study examined possible bidirectional associations between the study variables and found some evidence of bidirectional associations although, for the most part, emotional expressivity in G1 was most consistently predicted by K school adjustment. The tests of associations between K and G1 outcomes were relatively strict because controls for prior K levels of the study variables were included. In addition, we examined emotional expressivity in two school contexts and assessed multiple indices of school adjustment. Despite these strengths

and although data were from more than one source, one limitation of the study is the use of teachers' reports for most of the variables assessing school adjustment⁴ (except emotional expressivity which was observed by trained staff). Multiple reporters could offer a holistic representation of children's school adjustment as they relate to observed emotion expressivity across time. Data prior to K were not available, limiting our ability to examine temperament characteristics prior to K as possible precursors to bidirectional associations between emotional expressivity and school adjustment. Examining earlier time points could be a future research direction for clarifying the role of earlier life experiences, including early parent-child relationship quality, on both emotional expressivity and school adjustment.

Because positive and negative expressions were observed live, these were assessed globally (rather than specific emotions, e.g., contentment versus excitement). The lack of assessing specific emotions may be why most of the positive expressivity findings were null. Alternatively, positive emotions may not be as strongly associated with social interactions compared to negative emotions, consistent with prior research on associations between adjustment and experiences of negative valence (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). Positive emotion neither predicted nor was predicted by teacher-student closeness or conflict. In school, positive emotion may play different roles depending on the context in which it is expressed and on teachers' support for emotional expressivity in the classroom. Thus, there is a need to further examine positive emotional expressivity as it relates to teacher-student relationship quality. Furthermore, positive emotional expressivity can be examined across longer periods of time. A closer analysis of children's reciprocated emotional expressivity with peers (e.g., Spinrad et al., 2004) across different contexts may reveal more nuanced associations between positive emotions and children's school adjustment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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⁴In the current research project, peer nominations were used to assess peer acceptance in K but not in G1. For this study, we used teachers' reports of peer acceptance, which were assessed in K and G1.

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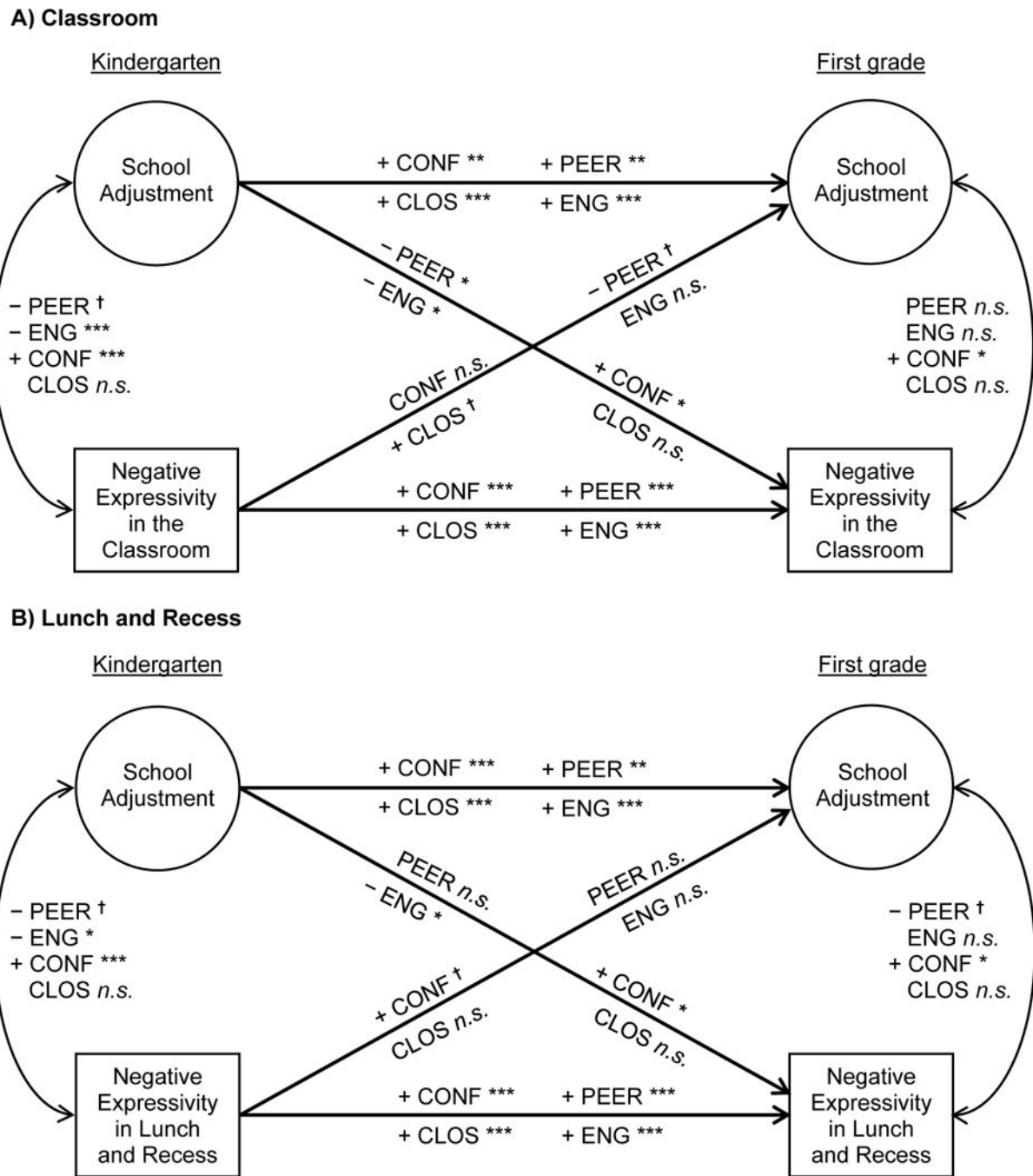


Figure 1. Summary of results from models with negative expressivity in (A) the classroom and (B) lunch and recess. Control variables included age, Hispanic status, sex, socioeconomic status. Positive (+) and negative (-) associations are summarized for various school adjustment variables (PEER = peer acceptance; ENG = school engagement; CONF = teacher–student conflict; CLOS = teacher–student closeness). † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

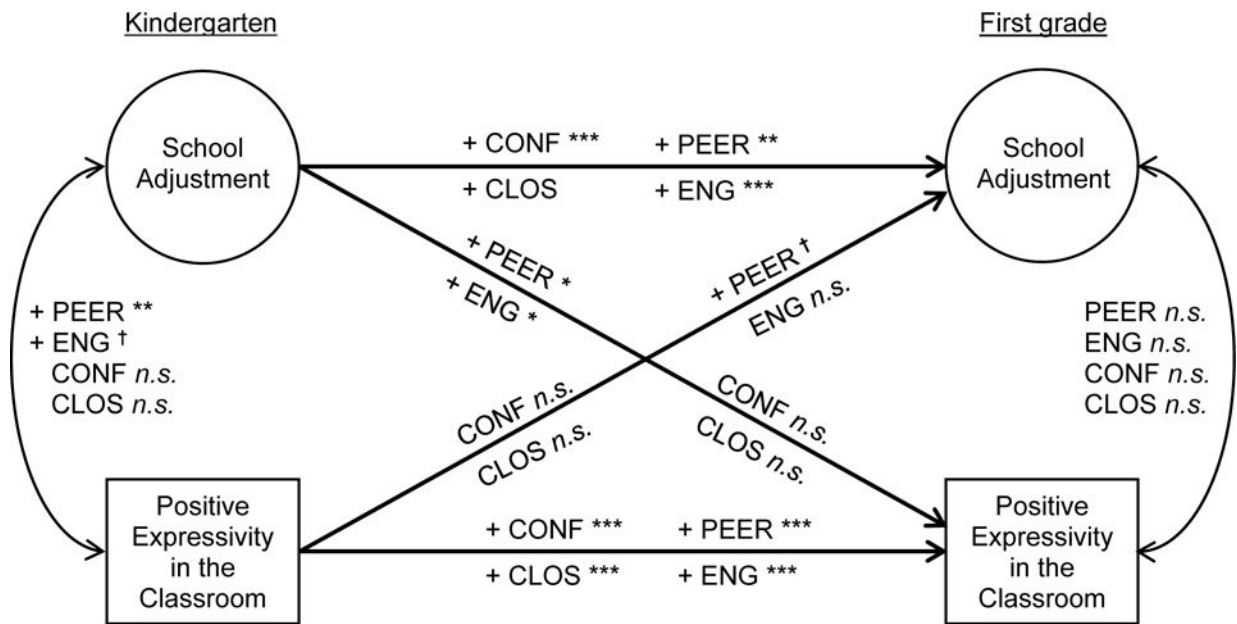


Figure 2. Summary of results from models with positive expressivity in the classroom. Findings from models with positive expressivity in lunch and recess were not depicted given that there were no significant cross-lagged effects with any school adjustment variables. Control variables included age, Hispanic status, sex, socioeconomic status. Positive (+) and negative (–) associations are summarized for various school adjustment variables (PEER = peer acceptance; ENG = school engagement; CONF = teacher–student conflict; CLOS = teacher–student closeness).
 † $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Descriptive Statistics and Correlations among Study Variables (N = 301)

Variable	Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1. Teacher-student conflict	K	-																							
2. Teacher-student conflict	G1	.28***	-																						
3. Teacher-student closeness	K	-.36***	-.11 [†]	-																					
4. Teacher-student closeness	G1	-.08	-.33***	.35***	-																				
5. Peer acceptance	K	-.62***	-.19**	.50***	.18**	-																			
6. Peer acceptance	G1	.24***	-.63***	.13 [†]	.41***	.23***	-																		
7. School liking	K	-.50***	-.16*	.47***	.08	.56***	.14*	-																	
8. School cooperation	K	-.74***	-.34***	.36***	.15*	.56***	.34***	.49***	-																
9. School independence	K	-.41***	-.21***	.31***	.18**	.44***	.26***	.47***	.68***	-															
10. School liking	G1	-.12 [†]	-.39***	.17***	.41***	.18**	.40***	.17**	.18**	.22***	-														
11. School cooperation	G1	-.36***	-.71***	.18***	.38***	.27***	.61***	.21***	.47***	.37***	.53***	-													
12. School independence	G1	-.31***	-.36***	.19***	.28***	.34***	.44***	.22***	.46***	.57***	.41***	.64***	-												
13. Positive expressivity in classroom	K	-.05	-.09	.11 [†]	-.02	.16**	.13*	.12*	.09	.15*	-.06	.06	.11 [†]	-											
14. Positive expressivity in classroom	G1	-.08	-.14*	-.02	.03	.16*	.16*	.16*	.10	.17**	.02	.07	.09	.56***	-										
15. Positive expressivity in lunch/recess	K	-.15*	-.10	.03	-.03	.28***	.13*	.19***	.20***	.17**	-.04	.11	.11 [†]	.62***	.45***	-									
16. Positive expressivity in lunch/recess	G1	-.12*	-.14*	-.07	-.06	.16**	.18**	.05	.14*	.13*	-.01	.11	.13*	.51***	.60***	.57***	-								
17. Negative expressivity in classroom	K	.37***	.23***	.02	.08	-.17**	-.13 [†]	-.26***	-.27***	-.11 [†]	-.01	-.18**	-.10	.09	.01	-.03	-.03	-							
18. Negative expressivity in classroom	G1	.30***	.27***	.00	-.05	-.21***	-.19**	-.06	-.31***	-.15*	-.11 [†]	-.23***	-.25***	.02	.03	-.13*	-.10	.36***	-						
19. Negative expressivity in lunch/recess	K	.30***	.22***	.07	.03	-.17**	-.11 [†]	-.08	-.21***	-.01	-.04	-.16*	-.05	.02	.07	-.16**	-.04	.55***	.32***	-					
20. Negative expressivity in lunch/recess	G1	.27***	.26***	.06	.02	-.17**	-.18**	.06	.24***	-.09	-.06	-.20**	-.17*	-.01	.07	-.06	-.11 [†]	.34***	.59***	.44***	-				
21. Age	K	.04	-.05	.06	.04	.06	.03	.01	.07	.13*	.02	.02	.04	.04	-.01	.16**	.01	-.07	-.01	-.01	.00	-			
22. Hispanic	K	-.01	-.17*	-.04	-.06	-.05	.07	-.06	.01	-.14*	-.01	.08	-.05	.08	.08	-.02	.17**	-.08	-.10	-.03	-.12 [†]	.11 [†]	-		
23. Male	K	.03	.01	-.10 [†]	-.06	.04	.04	-.04	-.05	-.04	-.21***	-.19***	-.10	.00	.11 [†]	.07	.02	-.12*	-.05	-.07	-.01	.12*	-.08	-	

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Variable	Time	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
24. Socioeconomic status	K	-0.05	.05	-0.01	-0.01	.07	-0.03	.12 [†]	-0.01	.15 [*]	.14 [*]	-0.04	.04	-0.03	-0.03	-0.07	-.20 ^{**}	.02	.00	.00	.07	-.10 [†]	-.37 ^{***}	.10 [†]	-
	M	1.55	1.41	4.38	4.38	3.60	3.64	2.81	2.67	2.35	2.79	2.70	2.34	0.71	0.60	1.30	1.27	0.06	0.04	0.10	0.09	5.48	0.57	0.49	-0.05
SD		0.86	0.71	0.63	0.62	0.58	0.55	0.32	0.43	0.55	0.31	0.45	0.53	0.26	0.24	0.37	0.39	0.06	0.04	0.09	0.09	0.35	0.50	0.50	0.91

Note. K = kindergarten; G1 = first grade; Hispanic (1 = *Hispanic*, 0 = *non-Hispanic*); Male (1 = *boy*, 0 = *girl*). In K, positive expressivity was significantly higher in the classroom context than in the lunch/recess context, $t(291) = -34.34, p < .001$, and negative expressivity was significantly higher in the classroom than in lunch/recess, $t(291) = -10.07, p < .001$. In G1, positive expressivity was significantly higher in the classroom than in lunch/recess, $t(236) = -33.66, p < .001$, and negative expressivity was significantly higher in the classroom than in lunch/recess, $t(236) = -10.83, p < .001$.

[†] $p < .10$

^{*} $p < .05$

^{**} $p < .01$

^{***} $p < .001$.